L Number	Hits	Search Text	DB	Time stamp
1	463	(microcantilever$) or (micro adj2 cantilever$)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 15:49
3	2	((microcantilever$) or (micro adj2 cantilever$)) and torsion adj2 bar	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 15:51
4	76	((microcantilever$) or (micro adj2 cantilever$)) and (antigen$ or antibod$ or ligand$ or receptor$)	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 15:52
5	5	(((microcantilever$) or (micro adj2 cantilever$)) and (antigen$ or antibod$ or ligand$ or receptor$)) and twist$	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 15:56
6	53	(((microcantilever$) or (micro adj2 cantilever$)) and (antigen$ or antibod$ or ligand$ or receptor$)) and deflect$	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:06
7	4935	atomic adj2 force adj2 microscope	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:07
8	206	(atomic adj2 force adj2 microscope) and twist$	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:07
9	102	((atomic adj2 force adj2 microscope) and twist$) and cantilever	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:07
10	10	((atomic adj2 force adj2 microscope) and twist$) and ((microcantilever$) or (micro adj2 cantilever$))	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:08
11	10	(((atomic adj2 force adj2 microscope) and twist$) and ((microcantilever$) or (micro adj2 cantilever$))) and twist$	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:12
12	2	'6573369'.pn.	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:13
13	0	'6573369'.pn. and twist$	USPAT; US-PGPUB; EPO; JPO; DERWENT	2004/05/16 16:13

L Number	Hits	Search Text	DB	Time stamp
1	3933	screening adj2 assay	USPAT	2004/05/16 19:51
2	0	(screening adj2 assay) and microcantilever$	USPAT	2004/05/16 19:51
3	2	(screening adj2 assay) and micro adj2 cantilever	USPAT	2004/05/16 19:51

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  * * * * * * * * * * * * * * STN  Columbus  * * * * * * * * * * * * * * *

FILE 'HOME' ENTERED AT 15:05:08 ON 16 MAY 2004

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COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                         0.21       0.21

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LAST RELOADED: May 14, 2004 (20040514/UP).

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COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                         0.06       0.27

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=> b ca
COST IN U.S. DOLLARS                                    SINCE FILE      TOTAL
                                                           ENTRY    SESSION
FULL ESTIMATED COST                                         0.21       0.48

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FILE COVERS 1907 - 13 May 2004 VOL 140 ISS 21
FILE LAST UPDATED: 13 May 2004  (20040513/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.


=> s (microcantilever?) or (micro(w)cantilever?)
           341 MICROCANTILEVER?
        118698 MICRO
          6546 CANTILEVER?
            91 MICRO(W)CANTILEVER?
L1         407 (MICROCANTILEVER?) OR (MICRO(W)CANTILEVER?)

=> s l1 and (ligand? or receptor? or antigen? or antibod? or avidin? or biotin?
        336518 LIGAND?
        642871 RECEPTOR?
```

```
        333199 ANTIGEN?
        390430 ANTIBOD?
          8191 AVIDIN?
         30731 BIOTIN?
         11950 HAPTEN?
        153252 NUCLEIC
       4424040 ACID?
        152352 NUCLEIC(W)ACID?
L2          41 L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDIN?
               OR BIOTIN? OR HAPTEN? OR NUCLEIC(W)ACID?)

=> s l2 and twist?
         35672 TWIST?
L3           0 L2 AND TWIST?

=> s l2 and deflect?
         24795 DEFLECT?
L4          20 L2 AND DEFLECT?

=> d all 1-20

L4   ANSWER 1 OF 20  CA  COPYRIGHT 2004 ACS on STN
AN   140:299675  CA
ED   Entered STN:  29 Apr 2004
TI   Stability of thiolated DNA on gold-coated   ***microcantilevers***
AU   Stevenson, Karen A.; Mehta, Adosh; Hansen, Karolyn M.; Thundat, Thomas G.
CS   Life Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN,
     37831, USA
SO   Proceedings - Electrochemical Society (2002), 2002-6(Microfabricated
     Systems and MEMS VI), 218-225
     CODEN: PESODO; ISSN: 0161-6374
PB   Electrochemical Society
DT   Journal
LA   English
CC   9-1 (Biochemical Methods)
AB   Bimetallic (Au/Si)   ***microcantilever***   sensors readily discern
     biomol. interactions, specifically DNA hybridization and   ***antibody***
     -  ***antigen***   interactions. These biomols. are typically immobilized
     on the gold cantilever surface via thiol chem.  Enzymic manipulation of
     the functionalized surfaces, whether for patterning or subsequent
     reactions, often requires the use of buffers contg. small thiol compds. to
     maintain the active state of the enzyme and facilitate the reaction.  In
     this study we examine the potential for loss of thiol-immobilized DNA from
     the cantilever surface due to competition and exchange with thiols in
     reaction buffer solns.  Optical   ***deflection***   assays and
     fluorescence imaging of cantilevers indicate that thiol-immobilized DNA is
     indeed lost from the sensor surface upon exposure to thiol-contg. buffers.
     Caution should be used when designing sensor surfaces: functionalization
     strategies must be compatible with the intended use of the sensor.
ST   stability thiol immobilization DNA gold   ***microcantilever***
IT   Biosensors
     Cantilevers (components)
        (stability of thiol-immobilized DNA on gold-coated
          ***microcantilevers***  )
IT   DNA
     RL: BUU (Biological use, unclassified); DEV (Device component use); PRP
     (Properties); BIOL (Biological study); USES (Uses)
        (thiol-immobilized; stability of thiol-immobilized DNA on gold-coated
          ***microcantilevers***  )
IT   7440-21-3, Silicon, biological studies   7440-57-5, Gold, biological
     studies
     RL: BUU (Biological use, unclassified); DEV (Device component use); BIOL
     (Biological study); USES (Uses)
```

(gold/silicon ***microcantilever*** ; stability of thiol-immobilized DNA on gold-coated ***microcantilevers***)
IT 2321-07-5, Fluorescein
RL: BUU (Biological use, unclassified); DEV (Device component use); PRP (Properties); BIOL (Biological study); USES (Uses)
(labeling of immobilized DNA; stability of thiol-immobilized DNA on gold-coated ***microcantilevers***)
RE.CNT 8 THERE ARE 8 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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(2) Collard, D; Langmuir 1991, V7, P1192 CA
(3) Fleming, M; Langmuir 2001, V17, P4836 CA
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(5) Hansen, K; Anal Chem 2001, V73, P1567 CA
(6) Hostetler, M; Langmuir 1999, V15, P3782 CA
(7) Schlenoff, J; J Am Chem Soc 1995, V117, P12528 CA
(8) Wu, G; Nat Biotech 2001, V19, P856 CA

L4 ANSWER 2 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 140:177482 CA
ED Entered STN: 11 Mar 2004
TI Design and analysis of ***microcantilevers*** for biosensing applications
AU Zhang, Xuan; Yang, Mo; Vafai, Kambiz; Ozkan, Cengiz S.
CS University of California-Riverside, USA
SO JALA (2003), 8(2), 90-93
CODEN: JALLFO; ISSN: 1535-5535
PB Association for Laboratory Automation
DT Journal
LA English
CC 9-1 (Biochemical Methods)
AB We have analyzed the detection of ***microcantilevers*** utilized in biosensing chips. First, the primary ***deflection*** due to the chem. reaction between the analyte mols. and the ***receptor*** coating, which produces surface stresses on the ***receptor*** side is analyzed. Oscillating flow conditions, which are the main source of turbulence in cantilever based biosensing chips, are found to produce substantial ***deflections*** in the ***microcantilever*** at relatively large frequency of turbulence. Then mech. design and optimization of piezoresistive cantilevers for biosensing applications is studied. Models are described for predicting the static behavior of cantilevers with elastic and piezoresistive layers. Chemo-mech. binding forces have been analyzed to understand issues of satn. over the cantilever surface. Furthermore, the introduction of stress concn. regions during cantilever fabrication has been discussed which greatly enhances the detection sensitivity through increased surface stress, and novel ***microcantilever*** assemblies are presented for the first time that can increase the ***deflection*** due to chem. reaction. Finally an expt. was made to demonstrate the shift of resonant frequency of cantilever used as biosensor. The relation between resonant frequency shift and the surface stress was analyzed.
ST ***microcantilever*** biosensor microarray modeling
IT Simulation and Modeling, physicochemical
(finite-element; ***microcantilevers*** for biosensing applications in microarrays)
IT Cantilevers (components)
(micro-; ***microcantilevers*** for biosensing applications in microarrays)
IT Analytical apparatus
Biosensors
Microarray technology
(***microcantilevers*** for biosensing applications in microarrays)
RE.CNT 3 THERE ARE 3 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE
(1) Fritz, J; Science 2000, V288, P316 CA
(2) Moulin, A; Ultramicroscopy 2000, V82, P23 CA
(3) Raiteri, R; Sensors and Actuators B 1999, V61

L4 ANSWER 3 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 140:73499 CA
ED Entered STN: 29 Jan 2004
TI Design and analysis of ***microcantilevers*** for biosensing applications
AU Zhang, Xuan; Yang, Mo; Ozkan, Cengiz S.
CS Mechanical Engineering Department, University of California, Riverside, CA, 92521, USA
SO Materials Research Society Symposium Proceedings (2003), 738(Spatially Resolved Characterization of Local Phenomena in Materials and Nanostructures), 375-380
CODEN: MRSPDH; ISSN: 0272-9172
PB Materials Research Society
DT Journal
LA English
CC 9-16 (Biochemical Methods)
Section cross-reference(s): 6
AB The primary ***deflection*** due to the chem. reaction between the analyte mols. and the ***receptor*** coating, which produces surface stresses on the ***receptor*** side is analyzed. The resonance frequency of ***microcantilevers*** is very sensitive to the properties of the ***microcantilever*** surface. Biosensing expts. based on resonance frequency shift are presented, which show that the results strongly depend on the interaction of specific analyte mols. with the ***receptor*** surface.
ST cantilever ***microcantilever*** biosensing ***receptor***
IT Piezoresistors
(cantilever; design and anal. of ***microcantilevers*** for biosensing applications)
IT Cantilever beams
Cantilevers (components)
(design and anal. of ***microcantilevers*** for biosensing applications)
IT ***Receptors***
RL: ANT (Analyte); BSU (Biological study, unclassified); ANST (Analytical study); BIOL (Biological study)
(design and anal. of ***microcantilevers*** for biosensing applications)
IT 60-23-1 1322-36-7, Dodecanethiol
RL: ARU (Analytical role, unclassified); BUU (Biological use, unclassified); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(self-assembled monolayer; design and anal. of ***microcantilevers*** for biosensing applications)
RE.CNT 14 THERE ARE 14 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Anon; Piezoelectric Technology Data for Designers 2000, P14
(2) Khaled, A; Journal of Sensors and Actuators, B submitted
(3) Lavrik, N; Biomedical Microdevices 2001, V3(1), P35 CA
(4) Lu, P; Mater Phys Mench 2001, V4, P51 CA
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(13) Vo-Dinh, T; Sensors and Actuators B 2001, V74, P2
(14) Wu, G; PNAS 2001, V98, P1560 CA

L4 ANSWER 4 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 140:22417 CA
ED Entered STN: 01 Jan 2004
TI Hybrid ***microcantilever*** sensors
IN Porter, Timothy L.; Macomber, Clay; Eastman, Michael
PA Arizona Board of Regents, USA
SO PCT Int. Appl., 70 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM C12Q
CC 80-2 (Organic Analytical Chemistry)
Section cross-reference(s): 9, 76
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI WO 2003102218	A2	20031211	WO 2003-US17560	20030603
WO 2003102218	A3	20040415		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI US 2002-385664P P 20020603

AB A hybrid sensor for detecting at least one analyte consists of a sensing material having at least volumetric and impedance responses to the presence of an analyte; at least one detector in elec. and phys. contact with the sensing material, and an analyzer for correlating the volumetric and impedance responses to det. at least one analyte. The detector is a frequency analyzer detecting the impedance by application of an a.c. to the sensing material. The detector includes a ***microcantilever*** sensor having a ***deflectable*** arm made of silicon nitride which ***deflects*** in response to a change in the thickness of the sensing material. The ***deflectable*** arm includes a piezoresistive member made of barium titanate and the detector includes an elec. circuit capable of measuring a change in resistance of the piezoresistive member due to the ***deflection*** . The sensing material of a chem. sensor is a polymer, such as polyvinyl acetate (PVA), polyisobutylene (PIB), polyethylenevinyl acetate (PEVA), poly(4-vinylphenol), poly(styrene-co-allyl alc.), poly(methylstyrene), poly(N-vinylpyrrolidone), poly(styrene), poly(sulfone), poly(methylmethacrylate), and poly(ethylene oxide). The sensing material contains at least one analyte sensitive dopant, such as nickel acetate, Pd, Pt, and lithium perchlorate. The analyte can be a volatile org. material. The sensing material of a biol. sensor contains biol. mols., such as ***antibodies*** , or a functionalized DNA strand disposed on a substrate. The hybrid sensors can be integrated into an array of sensors.

ST ***microcantilever*** sensor piezoelec impedance polymer volatile org; biosensor array ***microcantilever*** sensor piezoelec DNA ***antibody***

IT Piezoelectric sensors
(biosensors; hybrid ***microcantilever*** sensors)

IT Piezoelectric sensors
(gas; hybrid ***microcantilever*** sensors)

IT Biosensors
Electric impedance
(hybrid ***microcantilever*** sensors)
IT Volatile organic compounds
RL: ANT (Analyte); ANST (Analytical study)
(hybrid ***microcantilever*** sensors)
IT Cantilevers (components)
(***microcantilever*** ; hybrid ***microcantilever*** sensors)
IT Biosensors
Semiconductor gas sensors
(piezoelec.; hybrid ***microcantilever*** sensors)
IT ***Antibodies***
DNA
RL: DEV (Device component use); USES (Uses)
(sensitive material contg.; hybrid ***microcantilever*** sensors)
IT Polyoxyalkylenes, uses
Polysulfones, uses
RL: DEV (Device component use); USES (Uses)
(sensitive material; hybrid ***microcantilever*** sensors)
IT 12033-89-5, Silicon nitride (Si3N4), uses
RL: DEV (Device component use); USES (Uses)
(cantilever material; hybrid ***microcantilever*** sensors)
IT 64-17-5, Ethanol, analysis 67-64-1, Acetone, analysis 111-65-9, n-Octane, analysis 7732-18-5, Water, analysis
RL: ANT (Analyte); ANST (Analytical study)
(hybrid ***microcantilever*** sensors)
IT 12047-27-7, Barium titanate, uses
RL: DEV (Device component use); USES (Uses)
(piezoresistive member; hybrid ***microcantilever*** sensors)
IT 9003-20-7, Polyvinyl acetate 9003-27-4, Polyisobutylene 9003-39-8, Poly(N-vinylpyrrolidone) 9003-53-6, Poly(styrene) 9011-14-7, Poly(methylmethacrylate) 9017-21-4, Poly(methylstyrene) 24937-78-8, Polyethylenevinyl acetate 24979-70-2, Poly(4-vinylphenol) 25119-62-4, 2-Propen-1-ol, polymer with ethenylbenzene 25322-68-3, Poly(ethylene oxide)
RL: DEV (Device component use); USES (Uses)
(sensitive material; hybrid ***microcantilever*** sensors)
IT 373-02-4, Nickel acetate 7440-05-3, Palladium, uses 7440-06-4, Platinum, uses 7791-03-9, Lithium perchlorate
RL: DEV (Device component use); MOA (Modifier or additive use); USES (Uses)
(sensitive polymer doped with; hybrid ***microcantilever*** sensors)

L4 ANSWER 5 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 139:225029 CA
ED Entered STN: 02 Oct 2003
TI Flexoelectric origin of nanomechanic ***deflection*** in DNA-***microcantilever*** system
AU Liu, Fei; Zhang, Yong; Ou-Yang, Zhong-can
CS Institute of Theoretical Physics, The Chinese Academy of Sciences, Beijing, 100080, Peop. Rep. China
SO Biosensors & Bioelectronics (2003), 18(5-6), 655-660
CODEN: BBIOE4; ISSN: 0956-5663
PB Elsevier Science Ltd.
DT Journal
LA English
CC 3-1 (Biochemical Genetics)
Section cross-reference(s): 6, 9
AB The membrane theory is used to study the recently obsd. nanomech. bending of cantilevers, which have processed biomol. adsorption or biochem. reactions. To be different from entropy-controlling bending mechanism discussed before, we propose that the flexoelec. effect induces cantilever

bending. With the introduction of flexoelec. spontaneous curvature, the relation between the bending and biopolymer character is constructed by a simple anal. formula. The cantilever motion induced by adsorption of single-strand DNA and DNA hybridization reaction is quantified anal. and our results show good agreement with expts.

ST DNA hybridization adsorption ***microcantilever*** nanomech bending flexoelec effect

IT ***Nucleic*** ***acid*** hybridization
(DNA-DNA; flexoelec. origin of nanomechanic ***deflection*** in DNA- ***microcantilever*** system)

IT Biosensors
Cantilever beams
Cantilevers (components)
Flexoelectricity
(flexoelec. origin of nanomechanic ***deflection*** in DNA- ***microcantilever*** system)

IT Adsorption
Immobilization, molecular or cellular
(of single-strand DNA; flexoelec. origin of nanomechanic ***deflection*** in DNA- ***microcantilever*** system)

IT DNA
RL: ANT (Analyte); ARG (Analytical reagent use); PEP (Physical, engineering or chemical process); PYP (Physical process); ANST (Analytical study); PROC (Process); USES (Uses)
(single-stranded; flexoelec. origin of nanomechanic ***deflection*** in DNA- ***microcantilever*** system)

RE.CNT 30 THERE ARE 30 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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(2) Baller, M; Ultramicroscopy 2000, V82, P1 CA
(3) Baumann, C; Proc Natl Acad Sci USA 1997, V94, P6185 CA
(4) Berge, R; Science 1996, V276, P2021
(5) Biver, C; Macromolecules 1997, V30, P1787 CA
(6) Chakraborty, A; Annu Rev Phys Chem 2001, V52, P537 CA
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L4 ANSWER 6 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 139:146172 CA
ED Entered STN: 28 Aug 2003

TI Microfluidics apparatus and methods of use therefor
IN Peeters, John P.; Wiggins, Thomas; Ghosh, Madhushree; Bottomley, Lawrence A.; Seminara, Salvatore; Hu, Zhiyu; Seeley, Timothy; Kossek, Sebastian
PA Protiveris, Inc., USA
SO PCT Int. Appl., 53 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM A61K
CC 9-1 (Biochemical Methods)
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003065976	A2	20030814	WO 2002-US35990	20021108
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG				
	US 2003092016	A1	20030515	US 2001-54760	20011113
PRAI	US 2001-36733	A	20011109		
	US 2001-54760	A	20011113		

AB A microfluidics device includes a plurality of interaction cells and fluid control means including (i) means for providing to each of the plurality of interaction cells one or more prepn. fluids, and (ii) means for providing to each of the interaction cells a sample fluid, wherein each interaction cell receives a different sample fluid. A plurality of ***microcantilevers*** may be disposed in each of the interaction cells wherein each of the plurality of ***microcantilevers*** configured to ***deflect*** in response to an interaction involving a component of th sample fluid.
ST microfluidic app
IT Detergents
(denaturing; microfluidics app. and methods of use therefor)
IT Cantilevers (components)
(***microcantilever*** ; microfluidics app. and methods of use therefor)
IT Epitopes
Gel electrophoresis
Pumps
(microfluidics app. and methods of use therefor)
IT ***Antibodies***
DNA
Enzymes, analysis
Hormones, animal, analysis
Proteins
RNA
RL: ARU (Analytical role, unclassified); ANST (Analytical study)
(microfluidics app. and methods of use therefor)
IT Lab-on-a-chip
(microfluidics; microfluidics app. and methods of use therefor)

L4 ANSWER 7 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 139:96637 CA
ED Entered STN: 07 Aug 2003
TI Development of nanomechanical biosensors for detection of the pesticide DDT

AU Alvarez, Mar; Calle, Ana; Tamayo, Javier; Lechuga, Laura M.; Abad, Antonio; Montoya, Angel
CS Instituto de Microelectronica de Madrid (CNM-CSIC), Centro Nacional de Microelectronica, Biosensor Group Centro, Conscjo Superior de Investigaciones Cientificas, Madrid, 28760, Spain
SO Biosensors & Bioelectronics (2003), 18(5-6), 649-653
CODEN: BBIOE4; ISSN: 0956-5663
PB Elsevier Science Ltd.
DT Journal
LA English
CC 5-1 (Agrochemical Bioregulators)
Section cross-reference(s): 9, 80
AB A novel technique was used for detection of the organochlorine insecticide dichlorodiphenyltrichloroethane (DDT) by measuring the nanometer-scale bending of a ***microcantilever*** produced by differential surface stress. A synthetic ***hapten*** of the pesticide conjugated with bovine serum albumin (BSA) was covalently immobilized on the gold-coated side of the cantilever by using thiol self-assembled monolayers. The immobilization process was characterized by monitoring the cantilever ***deflection*** in real-time. Then, specific detection was achieved b exposing the cantilever to a soln. of a specific monoclonal ***antibody*** to the DDT ***hapten*** deriv. The specific binding of the ***antibodies*** on the cantilever sensitized side was measured with nanomolar sensitivity. Direct detection was proved by performing competitive assays, in which the cantilever was exposed to a mixed soln. of the monoclonal ***antibody*** and DDT. The future prospects and limitations to be overcome for the application of nanomech. sensors for pesticide detection are discussed.
ST nanomech biosensor pesticide detection; DDT detection immunoassay ***hapten*** conjugate; cantilever immobilized ***hapten*** conjugate insecticide detection
IT Immunoassay
(competitive; DDT detection with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on ***microcantilever*** by)
IT Cantilevers (components)
(***microcantilevers*** ; immunodetection of DDT with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on)
IT ***Antibodies***
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(monoclonal; to DDT ***hapten*** deriv. in competitive immunoassay for insecticide detection)
IT Biosensors
(nanomech.; with pesticide ***hapten*** conjugate immobilized on ***microcantilever*** for detection of DDT by competitive immunoassay)
IT Insecticides
(organochlorine; detection by competitive immunoassay with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on ***microcantilever***)
IT ***Haptens***
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(pesticide, conjugates with bovine serum albumin; detection of DDT by competitive immunoassay with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on ***microcantilever***)
IT Albumins, uses
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(serum, bovine, conjugates with pesticide ***hapten*** ; detection of DDT by competitive immunoassay with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on ***microcantilever***)
IT 405112-20-1D, conjugates with bovine serum albumin, immobilized
RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(detection of DDT by competitive immunoassay with nanomech. biosensor

with pesticide ***hapten*** conjugate immobilized on ***microcantilever***)

IT 50-29-3, DDT, analysis
RL: ANT (Analyte); ANST (Analytical study)
(immunodetection of DDT with nanomech. biosensor with pesticide ***hapten*** conjugate immobilized on ***microcantilever***)

RE.CNT 15 THERE ARE 15 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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(2) Berger, R; Science 1999, V276, P2021
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L4 ANSWER 8 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 139:32668 CA
ED Entered STN: 10 Jul 2003
TI Enantioselective sensors based on ***antibody*** -mediated nanomechanics

AU Dutta, P.; Tipple, C. A.; Lavrik, N. V.; Datskos, P. G.; Hofstetter, H.; Hofstetter, O.; Sepaniak, M. J.
CS Department of Chemistry, University of Tennessee, Knoxville, TN, 37996-1600, USA

SO Analytical Chemistry (2003), 75(10), 2342-2348
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
CC 9-1 (Biochemical Methods)

AB The use of microfabricated cantilevers as bioaffinity sensors was investigated. Since many bioaffinity interactions involve proteins as ***receptors*** , we conducted studies of the magnitude, kinetics, and reversibility of surface stresses caused when common proteins interact with ***microcantilevers*** (MCs) with nanostructured (roughened) gold surfaces on one side. Exposure of nanostructured, unfunctionalized MCs to the proteins IgG and bovine serum albumin (BSA) resulted in reversible large tensile stresses, whereas MCs with smooth gold surfaces on one side produced reversible responses that were considerably smaller and compressive. The response magnitude for nanostructured MCs exposed to BSA is shown to be concn. dependent, and linear calibration over the range of 1-200 mg/L is demonstrated. Stable, reusable protein bioaffinity phases based on unique enantioselective ***antibodies*** are created by covalently linking monoclonal ***antibodies*** to nanostructured MC surfaces. The direct (label-free) stereoselective detection of trace amts. of an important class of chiral analytes, the .alpha.-amino acids, was achieved based on immunomech. responses involving nanoscale bending of the cantilever. The temporal response of the cantilever (.DELTA. ***deflection*** /.DELTA. time) is linearly proportional to the analyte concn. and allows the quant. detn. of enantiomeric purity up to an enantiomeric excess of 99.8%. To our knowledge, this is the first demonstration of chiral discrimination using highly scalable microelectromech. systems.

ST enantioselective sensor ***antibody*** nanomechanic

IT Immunoglobulins
RL: ARU (Analytical role, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); ANST (Analytical study); PROC (Process)
(G; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Chirality
Enantiomers
Nanostructures
Stress, mechanical
(enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Amino acids, analysis
RL: ANT (Analyte); ANST (Analytical study)
(enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Calibration
(linear; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Cantilevers (components)
(***microcantilever*** ; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT ***Antibodies***
RL: ARU (Analytical role, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); ANST (Analytical study); PROC (Process)
(monoclonal; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Purity
(optical; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT Albumins, analysis
RL: ARU (Analytical role, unclassified); PEP (Physical, engineering or chemical process); PYP (Physical process); ANST (Analytical study); PROC (Process)
(serum, conujugates with p-azo-phenylalanine; enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT 63-68-3, L-Methionine, analysis 63-91-2, L-Phenylalanine, analysis 63-91-2D, L-Phenylalanine, p-azo derivs., conjugates with BSA 71-00-1, L-Histidine, analysis 72-18-4, L-Valine, analysis 73-22-3, L-Tryptophan, analysis 153-94-6, D-Tryptophan 348-67-4, D-Methionine 351-50-8, D-Histidine 640-68-6, D-Valine 673-06-3, D-Phenylalanine 673-06-3D, D-Phenylalanine, p-azo derivs., conjugates with BSA 102281-45-8, p-Amino-D-phenylalanine
RL: ANT (Analyte); ANST (Analytical study)
(enantioselective sensors based on ***antibody*** -mediated nanomechanics)
IT 7440-57-5, Gold, uses
RL: DEV (Device component use); USES (Uses)
(enantioselective sensors based on ***antibody*** -mediated nanomechanics)
RE.CNT 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L4 ANSWER 9 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 138:365101 CA
ED Entered STN: 05 Jun 2003
TI Microfluidics apparatus and methods for use thereof
IN Wiggins, Thomas; Ghosh, Madhushree; Bottomley, Lawrence A.; Seminara, Salvatore; Hu, Zhiya; Seeley, Timothy; Kossek, Sebastian
PA USA
SO U.S. Pat. Appl. Publ., 32 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM C12Q001-68
ICS G01N033-53; G01N033-542; C12M001-34
NCL 435006000; 435007900; 435287200
CC 9-1 (Biochemical Methods)
Section cross-reference(s): 2, 3, 15
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	US 2003092016	A1	20030515	US 2001-54760	20011113
	WO 2003065976	A2	20030814	WO 2002-US35990	20021108

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SC, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM
RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

PRAI US 2001-36733 A 20011109
US 2001-54760 A 20011113
AB A microfluidics device includes a plurality of interaction cells and fluid control means including (i) means for providing to the interaction cells a prepn. fluid, and (ii) means for providing to the interaction cells a

sample fluid, wherein each interaction cell receives a different sample fluid. A plurality of ***microcantilevers*** may be disposed in each of the interaction cells, wherein each of the plurality of ***microcantilevers*** configured to ***deflect*** in response to a interaction involving a component of the sample fluid.

ST microfluidic app

IT Detergents
(Denaturing; microfluidics app. and methods for use thereof)

IT Apparatus
(Microfluidics; microfluidics app. and methods for use thereof)

IT Cantilevers (components)
(***microcantilever*** ; microfluidics app. and methods for use thereof)

IT Affinity
Buffers
Communication
Configuration
Containers
Control apparatus
Epitopes
Flow
Fluids
Gases
Gel electrophoresis
Gel electrophoresis apparatus
Mass spectrometry
Pumps
Reaction
Robotics
Solutions
Thermoregulators
Valves
(microfluidics app. and methods for use thereof)

IT Hormones, animal, analysis
Peptides, analysis
Steroids, analysis
RL: ANT (Analyte); ANST (Analytical study)
(microfluidics app. and methods for use thereof)

IT ***Antibodies***
Antigens
Proteins
RL: ANT (Analyte); DEV (Device component use); NUU (Other use, unclassified); ANST (Analytical study); USES (Uses)
(microfluidics app. and methods for use thereof)

IT DNA
Enzymes, uses
Ligands
Nucleic ***acids***
RNA
RL: DEV (Device component use); NUU (Other use, unclassified); USES (Uses)
(microfluidics app. and methods for use thereof)

IT Gel electrophoresis apparatus
(multi dimensional; microfluidics app. and methods for use thereof)

IT Wastes
(receptacle; microfluidics app. and methods for use thereof)

L4 ANSWER 10 OF 20 CA COPYRIGHT 2004 ACS on STN

AN 138:250703 CA

ED Entered STN: 17 Apr 2003

TI ***Microcantilever*** apparatus for detection of enzymes and diagnostic applications

IN Bottomley, Lawrence A.; Ghosh, Madhushree; Shen, Shanxiang; Saul, Richard

PA Protiveris, Inc., USA

SO PCT Int. Appl., 32 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G01N
CC 7-1 (Enzymes)
Section cross-reference(s): 9, 14
FAN.CNT 2

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2003023363	A2	20030320	WO 2002-US28920	20020911
	WO 2003023363	A3	20031002		

W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM

RW: GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, SK, TR, BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG

	US 2003068655	A1	20030410	US 2001-951131	20010912
PRAI	US 2001-951131	A2	20010912		

AB An app. and a method are provided for detecting an enzyme by measuring a change in ***deflection*** of a ***microcantilever*** having a substrate for the enzyme. The invention provides a method for detecting an enzyme, the method comprising: depositing a coating material on a first surface of at least one ***microcantilever*** ; adding at least one substrate to the coating material, the substrate capable of interacting with the enzyme; exposing the ***microcantilever*** with the substrate to a sample; and measuring a ***deflection*** of the ***microcantilever*** , wherein the ***deflection*** indicates the presence of the enzyme in the sample. The substrate can be a biomaterial selected from the group consisting of a ***nucleic*** ***acid*** , a protein, a lipid, a hydrocarbon, and a polysaccharide. The invention is of use in proteomics, drug discovery, medical research, medical, veterinary, dental diagnostics, forensics, and military applications.

ST ***microcantilever*** enzyme detection biomaterial diagnostics

IT Immunoglobulins
RL: ARG (Analytical reagent use); DGN (Diagnostic use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(G, substrate; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Gangliosidosis
(Tay-Sachs disease; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Body fluid
(abdominal fluid, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Infection
(bacterial; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Crosslinking agents
(bifunctional; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Analytical apparatus
(biochem.; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Human
Mammalia
Vertebrata

(body fluid, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Diagnosis
Diagnosis
(cancer; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Electric capacitance
Lasers
Optical instruments
Piezoelectric apparatus
Piezoresistors
Tunneling
(***deflection*** measurement; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Metabolism, animal
(disorder, mannosidosis; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Amniotic fluid
Bile
Blood analysis
Body fluid
Cerebrospinal fluid
Culture media
Gastric juice
Intestinal juice
Lymph
Pleural fluid
Sweat
Synovial fluid
Tear (ocular fluid)
Urine analysis
Wastes
(enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Animal tissue
Plant tissue
(ext., enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Pericardium
(fluid, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Disease, animal
(genetic; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Kidney, disease
(glomerulus, X-linked; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Worm
(infestation with, Helminthiasis; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Body fluid
(interstitial, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Body fluid
(joint cavity fluid, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Cell
(lysate, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Cantilevers (components)
Force
(micro-; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Brain, neoplasm
Coating materials
Coating process
Drugs
Fabry disease
Gaucher disease
Infection
Lesch-Nyhan syndrome
Liver, neoplasm
Lung, neoplasm
Mammary gland, neoplasm
Microarray technology
Mucopolysaccharidosis
Mycosis
Pancreas, neoplasm
Prostate gland, neoplasm
Stress, mechanical
Surface free energy
(***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Enzymes, biological studies
Prostate-specific ***antigen***
RL: ANT (Analyte); DGN (Diagnostic use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Alloys, uses
Glass, uses
Metals, uses
Plastics, uses
Polymers, uses
RL: DEV (Device component use); USES (Uses)
(***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Micromachines
(microfluidics device; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Computers
(microprocessors; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Diagnosis
(mol.; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Nose
(nasal discharge, enzyme detection in; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Infection
(protozoan; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT ***Ligands***
RL: ARG (Analytical reagent use); DGN (Diagnostic use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(***receptor*** ; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Neisseria
(secreted protease; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT Biological materials
(substrate; ***microcantilever*** app. for detection of enzymes and diagnostic applications)
IT ***Antibodies***
Hydrocarbons, biological studies
Lipids, biological studies

Nucleic ***acids***
Polysaccharides, biological studies
Proteins
Steroids, biological studies
RL: ARG (Analytical reagent use); DGN (Diagnostic use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(substrate; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT Infection
(viral; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT 58626-38-3 68181-17-9 147072-47-7 191414-35-4
RL: DEV (Device component use); RCT (Reactant); RACT (Reactant or reagent); USES (Uses)
(bifunctional crosslinker; ***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT 9001-12-1, Collagenase 9001-73-4, Papain 9001-92-7, Endopeptidase 9012-30-0, Acetyl transferase 9013-05-2, Phosphatase 9027-34-3, Argininosuccinate lyase 9027-41-2, Hydrolase 9028-04-0 9030-83-5, 3-Hydroxy-3-methylglutaryl CoA lyase 9031-44-1, Kinase 9031-56-5, Ligase 9031-96-3, Exopeptidase 9032-20-6, Quinone oxidoreductase 9033-07-2, Glycosyl transferase 9037-42-7, DNA methyltransferase 9045-78-7, Isocitrate lyase 9047-61-4, Transferase 9055-04-3, Lyase 9055-15-6, Oxidoreductase 9075-08-5, Restriction endonuclease 9075-43-8, Hydroxylamine oxidoreductase 37228-74-3, Exonuclease 37259-58-8, Serine protease 50812-37-8, Glutathione S-transferase 81669-70-7, Metalloprotease 102925-41-7, Polysaccharide lyase 143375-68-2, Glyphosate oxidoreductase 344315-57-7, Polymerase 354575-51-2, Protein disulfide oxidoreductase
RL: ANT (Analyte); DGN (Diagnostic use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(***microcantilever*** app. for detection of enzymes and diagnostic applications)

IT 1303-00-0, Gallium arsenide, uses 1310-53-8, Germanium dioxide, uses 1314-13-2, Zinc oxide, uses 1314-61-0, Tantalum pentoxide 1344-28-1, Aluminum oxide, uses 7429-90-5, Aluminum, uses 7440-05-3, Palladium, uses 7440-21-3, Silicon, uses 7440-21-3D, Silicon, compds. 7440-22-4, Silver, uses 7440-32-6, Titanium, uses 7440-47-3, Chromium, uses 7440-50-8, Copper, uses 7440-56-4, Germanium, uses 7440-57-5, Gold, uses 7631-86-9, Silicon oxide, uses 7782-40-3, Diamond, uses 12033-89-5, Silicon nitride, uses 12645-46-4, Iridium oxide 14808-60-7, Quartz, uses
RL: DEV (Device component use); USES (Uses)
(***microcantilever*** app. for detection of enzymes and diagnostic applications)

L4 ANSWER 11 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 138:82662 CA
ED Entered STN: 30 Jan 2003
TI ***Microcantilever*** sensor
IN Porter, Timothy L.; Eastman, Michael P.
PA USA
SO U.S. Pat. Appl. Publ., 10 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM G01N029-02
NCL 073061490; 073061610
CC 80-2 (Organic Analytical Chemistry)
Section cross-reference(s): 9, 38
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE

PI US 2003010097 A1 20030116 US 2001-768647 20010124
US 6523392 B2 20030225
PRAI US 2000-178530P P 20000125
AB An app. and method for sensing chem. and/or biol. analytes includes a ***deflectable*** arm of a ***microcantilever*** formed over and contacting a sensing element. A gaseous or liq. medium which may include the analyte being detected, is introduced to the sensing element. The sensing element undergoes volumetric expansion or contraction in the presence of the analyte sought to be detected, typically by adsorbing the analyte. The volumetric change of the sensing element causes the ***deflectable*** arm to ***deflect*** . The ***deflectable*** arm includes at least one measurable phys. property which changes when the arm ***deflects*** . Detecting means are provided to measure the change in the phys. property to det. the presence and amt. of analyte present. An array of ***microcantilevers*** in which each ***microcantilever*** is dedicated to detecting a particular analyte which may be included in the medium, is also provided.
ST ***microcantilever*** sensor system
IT Electric circuits
Expansion
Microsensors
Piezoresistance
Transducers
Virus
(***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)
IT cDNA
RL: ANT (Analyte); ANST (Analytical study)
(***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)
IT ***Antibodies***
Polyoxyalkylenes, uses
Polysulfones, uses
RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)
IT DNA
RL: ARU (Analytical role, unclassified); ANST (Analytical study)
(double-stranded; ***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)
IT Cantilevers (components)
(***microcantilever*** ; ***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/o biol. analytes)
IT DNA
RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(single-stranded, thiolated; ***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/o biol. analytes)
IT 9003-20-7, Polyvinyl acetate 9003-27-4, Polyisobutylene 9003-39-8, Poly(N-vinylpyrrolidone) 9003-53-6, Poly(styrene) 9011-14-7, Poly(methyl methacrylate) 9017-21-4, Poly(methylstyrene) 24937-78-8, Polyethylene vinyl acetate 24979-70-2, Poly(4-vinylphenol) 25119-62-4, Poly(styrene-allyl alcohol) 25322-68-3, Poly(ethylene oxide)
RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)
IT 12033-89-5, Silicon nitride (Si3N4), analysis 12047-27-7, Barium titanate, analysis
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST

(Analytical study); USES (Uses)
(***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)

IT 7440-57-5, Gold, uses
RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(substrate; ***deflectable*** ***microcantilever*** sensor for sensing the presence of chem. and/or biol. analytes)

L4 ANSWER 12 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 137:322240 CA
ED Entered STN: 21 Nov 2002
TI Nanomechanical Forces Generated by Surface Grafted DNA
AU Hagan, Michael F.; Majumdar, Arun; Chakraborty, Arup K.
CS Department of Chemical Engineering, Department of Mechanical Engineering and Department of Chemistry, University of California, Berkeley, CA, 94720, USA
SO Journal of Physical Chemistry B (2002), 106(39), 10163-10173
CODEN: JPCBFK; ISSN: 1520-6106
PB American Chemical Society
DT Journal
LA English
CC 9-16 (Biochemical Methods)
Section cross-reference(s): 3
AB Recent expts. show that the adsorption of biomols. on one surface of a ***microcantilever*** generates surface stresses that cause the cantilever to ***deflect*** . If a second species binds to the adsorbed mols., the stresses change, resulting in a different ***deflection*** . By choosing adsorbed probe mols. that recognize specific mols., it may be possible to detect pathogens and biohazards. In particular, Fritz et al. (Fritz, J.; Baller, M. K.; Lang, H. P.; Rothuizen, H.; Vettiger, P.; Meyer, E.; Guntherodt, H.-J.; Gerber, Ch.; Gimzewski, J. K. Science 2000, 288, 316) and Wu et al. (Wu, G.; Haifeng, J.; Hansen, K.; Thundat, T.; Datar, R.; Cote, R.; Hagan, M. F.; Chakraborty, A. K.; Majumdar, A. Proc. Natl. Acad. Sci. U.S.A. 2001, 98, 1560) show that the presence of an individual sequence of DNA may be identified by observing the change in ***deflection*** as hybridization occurs. Also, it has been shown that this platform can detect prostate specific ***antigen*** (PSA). However, to exploit this phenomenon for the development of reliable microdevices, it is necessary to understand the origin of the nanomech. forces that lead to cantilever ***deflection*** upon mol. recognition, as well as the dependence of such ***deflections*** on the identity and concn. of the target mol. In this paper, we present a model with which we examine cantilever ***deflections*** resulting from adsorption and subsequent hybridizatio of DNA mols. Using an empirical potential, we predict ***deflections*** upon hybridization that are consistent with exptl. results. We find that the dominant contribution to these ***deflections*** arises from hydration forces, not conformational entropy or electrostatics. Cantilever ***deflections*** upon adsorption of single stranded DNA are smaller that those predicted after hybridization for reasonable interaction strengths. This is consistent with results in Fritz et al., but not those in Wu et al. The ***deflections*** predicted for DNA before and after hybridization are strongly dependent on surface coverage, as well as the degree of disorder on the surface. We argue that self-assembly of probe mols. on the cantilever surface must be carefully controlled and characterized for the realization of microdevices for pathogen detection that rely on nanomech. forces generated by mol. recognition.
ST nanomech force cantilever ***deflection*** DNA; adsorption hybridization DNA recognition model
IT Entropy
(conformational; model of cantilever ***deflections*** resulting

from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT Force
(hydration force; model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT Cantilevers (components)
(***microcantilevers*** ; model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT Adsorption
Disorder
Molecular recognition
Nucleic ***acid*** hybridization
Potential energy
Simulation and Modeling, biological
Simulation and Modeling, physicochemical
(model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT DNA
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)
(model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT Electrostatic force
(repulsive; model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

IT DNA
RL: PEP (Physical, engineering or chemical process); PRP (Properties); PYP (Physical process); PROC (Process)
(single-stranded; model of cantilever ***deflections*** resulting from adsorption and subsequent hybridization of DNA mols. in relation to mol. recognition)

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L4 ANSWER 13 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 137:72229 CA
ED Entered STN: 25 Jul 2002
TI Nanostructured ***Microcantilevers*** with Functionalized Cyclodextrin ***Receptor*** Phases: Self-Assembled Monolayers and Vapor-Deposited Films
AU Tipple, Christopher A.; Lavrik, Nickolay V.; Culha, Mustafa; Headrick, Jeremy; Datskos, Panos; Sepaniak, Michael J.
CS The University of Tennessee and Oak Ridge National Laboratory, Knoxville, USA
SO Analytical Chemistry (2002), 74(13), 3118-3126
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
CC 80-2 (Organic Analytical Chemistry)
AB The performance of microcantilver-based chem. sensors in a liq. environment is affected by altering cantilever surface morphol. and ***receptor*** phase type and thickness. Self-assembled monolayers of thiolated .beta.-cyclodextrin (HM-.beta.-CD) and thin films of vapor-deposited heptakis(2,3-O-diacetyl-6-O-tertbutyl-dimethylsilyl)-.beta.-cyclodextrin (HDATB-.beta.-CD) were studied on smooth and nanostructured (dealloyed) gold-coated ***microcantilever*** surfaces. The dealloyed surface contains nanometer-sized features that enhance the transduction of mol. recognition events into cantilever response, as well as increase film stability for thicker films. Improvements in the limits of detection of the compd. 2,3-dihydroxynaphthalene .ltoreq.2 orders of magnitude were achieved by manipulating surface morphol. and film thickness. The obsd. response factors for the analytes studied varied from 0.02-604 nm/ppm, as detd. by cantilever ***deflection*** . In general, calibration plots for the analytes were linear up to several hundred nanometers in cantilever ***deflections*** .
ST nanostructured ***microcantilever*** cyclodextrin ***receptor*** phase monolayer vapor deposited film
IT Cantilevers (components)
(micro; self-assembled monolayers and vapor-deposited films for

nanostructured ***microcantilevers*** with functionalized cyclodextrin ***receptor*** phases)

IT Sensors
(self-assembled monolayers and vapor-deposited films for nanostructured ***microcantilevers*** with functionalized cyclodextrin ***receptor*** phases)

IT 92-44-4, 2,3-Dihydroxynaphthalene 575-38-2, 1,7-Dihydroxynaphthalene 582-17-2, 2,7-Dihydroxynaphthalene
RL: ANT (Analyte); ANST (Analytical study)
(analyte; self-assembled monolayers and vapor-deposited films for nanostructured ***microcantilevers*** with functionalized cyclodextrin ***receptor*** phases)

IT 59-98-3, Tolazoline 65-85-0, Benzoic acid, analysis 299-42-3, Ephedrine
RL: ARU (Analytical role, unclassified); ANST (Analytical study)
(self-assembled monolayers and vapor-deposited films for nanostructured ***microcantilevers*** with functionalized cyclodextrin ***receptor*** phases)

IT 7440-57-5, Gold, analysis 123172-94-1 160661-60-9
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(self-assembled monolayers and vapor-deposited films for nanostructured ***microcantilevers*** with functionalized cyclodextrin ***receptor*** phases)

RE.CNT 36 THERE ARE 36 CITED REFERENCES AVAILABLE FOR THIS RECORD

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L4 ANSWER 14 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 136:398201 CA
ED Entered STN: 20 Jun 2002
TI Assay of chemical binding
IN Sofield, Carl John; Morgan, George Richard; Harper, Ruth Elizabeth; Stockford, Gavin John
PA UK
SO U.S. Pat. Appl. Publ., 6 pp.
CODEN: USXXCO
DT Patent
LA English
IC ICM G01N033-543
NCL 436518000
CC 9-16 (Biochemical Methods)
FAN.CNT 1

PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
US 2002072127	A1	20020613	US 2000-734664	20001213

PRAI US 2000-734664 20001213
OS MARPAT 136:398201
AB A method of comparing the binding strengths of a plurality of different ***ligands*** to a ***receptor*** , in which several ***micro*** ***cantilever*** structures are coated with the ***receptor*** on a least a part of a surface of each ***micro*** - ***cantilever*** structure. Each ***micro*** - ***cantilever*** structure is then contacted with a different ***ligand*** soln., and the amts. by which the ***micro*** - ***cantilever*** structures ***deflect*** are compared. The ***deflection*** may be detected by an optical lever. The ***micro*** - ***cantilever*** structures may be in the form of an array, each structure being in a resp. well, to which ***ligand*** solns. are added.
ST chem binding ***microcantilever*** microstructure mol surface
IT Microstructure
Molecular association
Molecular recognition
Molecular surface
(assay of chem. binding)
IT ***Ligands***
Receptors
RL: PEP (Physical, engineering or chemical process); PYP (Physical process); PROC (Process)
(assay of chem. binding)
IT Cantilevers (components)
(micro-; assay of chem. binding)

L4 ANSWER 15 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 135:269477 CA
ED Entered STN: 25 Oct 2001
TI Nanomechanical detection of biomolecular interactions
AU Hansen, Karolyn M.; Wu, Guanghua; Ji, Hai-Feng; Thundat, Thomas; Datar, Ram; Cote, Richard; Majumdar, Arunava
CS Life Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA
SO Proceedings - Electrochemical Society (2000), 2000-19(Microfabricated Systems and MEMS V), 200-207
CODEN: PESODO; ISSN: 0161-6374
PB Electrochemical Society
DT Journal
LA English
CC 9-1 (Biochemical Methods)
AB This paper reports a novel approach for biomol. detection based on the observation that when one surface of a ***microcantilever*** beam is coated with a self-assembled monolayer of ***receptor*** mols.,

biomol. binding of ***ligand*** on the monolayer produces a differential surface stress that is sufficiently large to bend the cantilever. Such bending can be detected optically, obviating the need for extrinsic labeling. Silicon at. force microscopy ***microcantilevers*** were coated on one side with gold to create a bimetallic cantilever beam. Thiol-modified single stranded DNA of known sequence was immobilized on the gold side. Exposure to complementary DNA resulted in upward ***deflection*** of the cantilever, the magnitude of which is dependent upon the length of the complementary DNA strand. We can clearly discriminate a one nucleotide difference in sequence length. We propose that this optical ***deflection*** technique is sufficiently general and could potentially be used for specific recognition of other important biomol. binding reactions.

ST nanomech detection biomol interaction

IT Cantilevers (components)
(***microcantilever*** ; nanomech. detection of biomol. interactions)

IT Atomic force microscopy
Bending
Cantilever beams
Immobilization, biochemical
Self-assembled monolayers
Simulation and Modeling, physicochemical
Stress, mechanical
(nanomech. detection of biomol. interactions)

IT cDNA
RL: ANT (Analyte); ANST (Analytical study)
(nanomech. detection of biomol. interactions)

IT Thiols (organic), uses
RL: DEV (Device component use); PEP (Physical, engineering or chemical process); PROC (Process); USES (Uses)
(nanomech. detection of biomol. interactions)

IT DNA
RL: ARU (Analytical role, unclassified); DEV (Device component use); PEP (Physical, engineering or chemical process); ANST (Analytical study); PROC (Process); USES (Uses)
(single-stranded; nanomech. detection of biomol. interactions)

IT 7440-57-5, Gold, uses
RL: DEV (Device component use); USES (Uses)
(nanomech. detection of biomol. interactions)

RE.CNT 27 THERE ARE 27 CITED REFERENCES AVAILABLE FOR THIS RECORD

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L4 ANSWER 16 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 135:25148 CA
ED Entered STN: 28 Jun 2001
TI Enhanced chemi-mechanical transduction at nanostructured interfaces
AU Lavrik, N. V.; Tipple, C. A.; Sepaniak, M. J.; Datskos, P. G.
CS Department of Chemistry, University of Tennessee, Knoxville, Knoxville, TN, 37919, USA
SO Chemical Physics Letters (2001), 336(5,6), 371-376
CODEN: CHPLBC; ISSN: 0009-2614
PB Elsevier Science B.V.
DT Journal
LA English
CC 66-4 (Surface Chemistry and Colloids)
Section cross-reference(s): 76
AB Interfacial mol. recognition processes can be converted into mech. responses via modulation of surface stress. The authors demonstrate dramatic enhancement in this transduction when quasi 3-dimensional interfaces with nano-size features were used. ***Microcantilever*** surfaces are modified with gold nanospheres or granular films and functionalized with macrocycle cavity and ***receptors*** . ***Deflections*** of these nanostructured cantilevers in response to vapor phase hydrocarbons are two orders of magnitude larger than with conventional smooth surfaces. Such a significant enhancements of surface stress changes resulting from intermol. interactions at vapor- and liq.-solid interfaces offer an attractive means to develop novel nano-mech. devices that respond directly and sensitively to chem. stimuli.
ST chemimech transduction nanostructured interface ***microcantilever***
IT Cantilevers (components)
Gas sensors
Interface
Interfacial structure
Micromachines
Transducers
(***microcantilever*** surfaces in modified and enhanced chemi-mech. transduction at nanostructured interfaces)
IT Stress, mechanical
(surface; ***microcantilever*** surfaces in modified and enhanced chemi-mech. transduction at nanostructured interfaces)
RE.CNT 29 THERE ARE 29 CITED REFERENCES AVAILABLE FOR THIS RECORD
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L4 ANSWER 17 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 134:173572 CA
ED Entered STN: 15 Mar 2001
TI Cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches
AU Hansen, Karolyn M.; Ji, Hai-Feng; Wu, Guanghua; Datar, Ram; Cote, Richard; Majumdar, Arunava; Thundat, Thomas
CS Life Sciences Division, Oak Ridge National Laboratory, Oak Ridge, TN, 37831, USA
SO Analytical Chemistry (2001), 73(7), 1567-1571
CODEN: ANCHAM; ISSN: 0003-2700
PB American Chemical Society
DT Journal
LA English
CC 3-1 (Biochemical Genetics)
Section cross-reference(s): 9
AB Characterization of single-nucleotide polymorphisms is a major focus of current genomics research. We demonstrate the discrimination of DNA mismatches using an elegantly simple ***microcantilever*** -based optical ***deflection*** assay, without the need for external labeling. Gold-coated silicon AFM cantilevers were functionalized with thiolated 20- or 25-mer probe DNA oligonucleotides and exposed to target oligonucleotides of varying sequence in static and flow conditions. Hybridization of 10-mer complementary target oligonucleotides resulted in net pos. ***deflection*** , while hybridization with targets contg. one or two internal mismatches resulted in net neg. ***deflection*** . Mismatched targets produced a stable and measurable signal when only a four-base pair stretch was complementary to the probe sequence. This technique is readily adaptable to a high-throughput array format and provides a distinct pos./neg. signal for easy interpretation of oligonucleotide hybridization.
ST cantilever optical ***deflection*** assay DNA oligonucleotide hybridization; single nucleotide polymorphism cantilever optical ***deflection*** assay
IT ***Nucleic*** ***acid*** hybridization
(DNA-DNA, cantilever-based optical ***deflection*** assay; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)
IT Optical instruments
(***deflectors*** ; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)
IT Cantilever beams
(micro-, silicon; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)
IT Genetic polymorphism
(single nucleotide; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)
IT Probes (***nucleic*** ***acid***)

RL: ARG (Analytical reagent use); ANST (Analytical study); USES (Uses)
(thiolated; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)

IT 7440-21-3, Silicon, uses
RL: DEV (Device component use); USES (Uses)
(cantilevers; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)

IT 7440-57-5, Gold, uses
RL: DEV (Device component use); USES (Uses)
(silicon AFM cantilevers coated with; cantilever-based optical ***deflection*** assay for discrimination of DNA single-nucleotide mismatches)

RE.CNT 34 THERE ARE 34 CITED REFERENCES AVAILABLE FOR THIS RECORD

RE

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L4 ANSWER 18 OF 20 CA
AN 133:280572 CA
ED Entered STN: 02 Nov 2000
TI Micromechanical ***antibody*** sensor
IN Thundat, Thomas G.; Jacobson, K. Bruce; Doktycz, Mitchel J.; Kennel, Stephen J.; Warmack, Robert J.
PA Lockheed Martin Energy Research Corporation, USA
SO PCT Int. Appl., 15 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G01N033-53
CC 15-3 (Immunochemistry)

Section cross-reference(s): 2, 3, 9

FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000058729	A2	20001005	WO 2000-US8256	20000329
	WO 2000058729	A3	20010517		
	W: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, TZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	US 6289717	B1	20010918	US 1999-281032	19990330
	EP 1185865	A2	20020313	EP 2000-918480	20000329
	R: AT, BE, CH, DE, DK, ES, FR, GB, GR, IT, LI, LU, NL, SE, MC, PT, IE, SI, LT, LV, FI, RO				
PRAI	US 1999-281032	A	19990330		
	WO 2000-US8256	W	20000329		

AB A sensor app. is provided using a ***microcantilevered*** spring element having a coating of a detector mol. such as an ***antibody*** or ***antigen*** . A sample contg. a target mol. or substrate is provided to the coating. The spring element bends in response to the stress induced by the binding which occurs between the detector and target mols. ***Deflections*** of the cantilever are detected by a variety of detection techniques. The ***microcantilever*** may be approx. 1 to 200 <mm long, approx. 1 to 50 <mm wide, and approx. 0.3 to 3.0 <mm thick. A sensitivity for detection of ***deflections*** is in the range of 0.01 nm.

ST sensor ***microcantilever*** ***antigen*** ***antibody*** nucleotide probe; steroid hormone sensor ***microcantilever***

IT Biochemical molecules
(binding pair; micromech. ***antibody*** sensor)

IT ***Nucleic*** ***acids***
Probes (***nucleic*** ***acid***)
RL: ANT (Analyte); ARG (Analytical reagent use); BSU (Biological study, unclassified); DEV (Device component use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(binding pair; micromech. ***antibody*** sensor)

IT Materials
(biochems., binding pair; micromech. ***antibody*** sensor)

IT Immunoassay
(enzyme-linked immunosorbent assay; micromech. ***antibody*** sensor)

IT Steroids, biological studies
RL: ANT (Analyte); ARG (Analytical reagent use); BSU (Biological study, unclassified); DEV (Device component use); ANST (Analytical study); BIOL (Biological study); USES (Uses)
(hormones, binding pair; micromech. ***antibody*** sensor)

IT Cantilevers (components)
(micro-; micromech. ***antibody*** sensor)

IT Biosensors
Ceramics
Laser spectroscopy
Microorganism
Spectroscopy
(micromech. ***antibody*** sensor)

IT ***Antigens***
RL: ANT (Analyte); ARG (Analytical reagent use); BSU (Biological study, unclassified); DEV (Device component use); ANST (Analytical study); BIOL (Biological study); USES (Uses)

(micromech. ***antibody*** sensor)
IT ***Antibodies***
RL: ANT (Analyte); ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(micromech. ***antibody*** sensor)
IT Polymers, analysis
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(micromech. ***antibody*** sensor)
IT Computers
(microprocessors, data anal.; micromech. ***antibody*** sensor)
IT ***Antibodies***
RL: ARG (Analytical reagent use); DEV (Device component use); ANST (Analytical study); USES (Uses)
(monoclonal; micromech. ***antibody*** sensor)
IT 1303-00-0, Gallium arsenide, analysis 1310-53-8, Germanium dioxide, analysis 1314-13-2, Zinc oxide, analysis 1314-61-0, Tantalum pentoxide 1344-28-1, Aluminum oxide, analysis 7440-21-3, Silicon, analysis 7440-56-4, Germanium, analysis 7631-86-9, Silicon oxide, analysis 12033-89-5, Silicon nitride, analysis 14808-60-7, Quartz, analysis 25104-18-1, Poly-L-lysine 38000-06-5, Poly-L-lysine
RL: ARU (Analytical role, unclassified); DEV (Device component use); ANST (Analytical study); USES (Uses)
(micromech. ***antibody*** sensor)

L4 ANSWER 19 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 133:55441 CA
ED Entered STN: 21 Jul 2000
TI Translating biomolecular recognition into nanomechanics
AU Fritz, J.; Baller, M. K.; Lang, H. P.; Rothuizen, H.; Vettiger, P.; Meyer, E.; Guntherodt, H.-J.; Gerber, Ch.; Gimzewski, J. K.
CS IBM Research, Zurich Research Laboratory, Rueschlikon, CH-8803, Switz.
SO Science (Washington, D. C.) (2000), 288(5464), 316-318
CODEN: SCIEAS; ISSN: 0036-8075
PB American Association for the Advancement of Science
DT Journal
LA English
CC 9-1 (Biochemical Methods)
Section cross-reference(s): 6
AB We report the specific transduction, via surface stress changes, of DNA hybridization and ***receptor*** - ***ligand*** binding into a direct nanomech. response of microfabricated cantilevers. Cantilevers in an array were functionalized with a selection of biomols. The differential ***deflection*** of the cantilevers was found to provide a true mol. recognition signal despite large nonspecific responses of individual cantilevers. Hybridization of complementary oligonucleotides shows that a single base mismatch between two 12-mer oligonucleotides is clearly detectable. Similar expts. on protein A-Ig interactions demonstrate the wide-ranging applicability of nanomech. transduction to detect biomol. recognition.
ST biomol recognition nanomech transduction ***micro*** ***cantilever*** ; mol recognition nanomech transduction ***micro*** ***cantilever***
IT DNA
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(-DNA mol. recognition; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT Proteins, specific or class
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(A, binding by IgG; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)

IT Immunoglobulins
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(G, binding by protein A; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT Cantilever beams
(micro-; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT Classical mechanics
(nanomechanics; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT Stress, mechanical
(surface, transduction; translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT Micromachines
Molecular recognition
(translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
IT 273954-69-1 273954-70-4 273954-71-5 273954-72-6
RL: BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); BIOL (Biological study); PROC (Process)
(translating biomol. recognition into nanomechanics using ***micro*** - ***cantilevers***)
RE.CNT 20 THERE ARE 20 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
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(20) Viani, M; J Appl Phys 1999, V86, P2258 CA

L4 ANSWER 20 OF 20 CA COPYRIGHT 2004 ACS on STN
AN 132:191401 CA
ED Entered STN: 31 Mar 2000
TI Assay of ***receptor*** and ***ligand*** chemical binding using ***micro*** - ***cantilevers***
IN Sofield, Carl John; Morgan, George Richard; Harper, Ruth Elizabeth; Stockford, Gavin John
PA AEA Technology PLC, UK
SO PCT Int. Appl., 20 pp.
CODEN: PIXXD2
DT Patent
LA English
IC ICM G01N033-543
ICS G01N027-00
CC 9-1 (Biochemical Methods)
Section cross-reference(s): 6
FAN.CNT 1

	PATENT NO.	KIND	DATE	APPLICATION NO.	DATE
PI	WO 2000014539	A1	20000316	WO 1999-GB2952	19990906
	W: AE, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, US, UZ, VN, YU, ZA, ZW, AM, AZ, BY, KG, KZ, MD, RU, TJ, TM				
	RW: GH, GM, KE, LS, MW, SD, SL, SZ, UG, ZW, AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG				
	AU 9956418	A1	20000327	AU 1999-56418	19990906
PRAI	GB 1998-19319	A	19980905		
	WO 1999-GB2952	W	19990906		

OS MARPAT 132:191401

AB A method of comparing the binding strengths of a plurality of different ***ligands*** to a ***receptor*** , in which several ***micro*** ***cantilever*** structures are coated with the ***receptor*** on a least a part of a surface of each ***micro*** - ***cantilever*** structure. Each ***micro*** - ***cantilever*** structure is then contacted with a different ***ligand*** soln., and the amts. by which the ***micro*** - ***cantilever*** structures ***deflect*** are compared. The ***deflection*** may be detected by an optical lever. The ***micro*** - ***cantilever*** structures may be in the form of an array, each structure being in a resp. well, to which ***ligand*** solns. are added.

ST binding assay ***receptor*** ***ligand*** cantilever app

IT Immunoglobulins
RL: ANT (Analyte); ARU (Analytical role, unclassified); BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); ANST (Analytical study); BIOL (Biological study); PROC (Process)
(G; assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT Affinity
Molecular association
(assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT ***Avidins***
Ligands
Receptors
RL: ANT (Analyte); ARU (Analytical role, unclassified); BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); ANST (Analytical study); BIOL (Biological study); PROC (Process)
(assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT Apparatus
(***micro*** - ***cantilevers*** ; assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT Cantilevers (components)
(micro; assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT 58-85-5, ***Biotin***
RL: ANT (Analyte); ARU (Analytical role, unclassified); BPR (Biological process); BSU (Biological study, unclassified); PRP (Properties); ANST (Analytical study); BIOL (Biological study); PROC (Process)
(assay of ***receptor*** and ***ligand*** chem. binding using ***micro*** - ***cantilevers***)

IT 2885-00-9, Octadecanethiol 7440-47-3, Chromium, uses 7440-57-5, Gold, uses 12033-89-5, Silicon nitride, uses
RL: DEV (Device component use); USES (Uses)
(assay of ***receptor*** and ***ligand*** chem. binding using

```
          ***micro***  -  ***cantilevers***  )
RE.CNT  4     THERE ARE 4 CITED REFERENCES AVAILABLE FOR THIS RECORD
RE
(1) Hewlett-Packard Company; EP 0657737 A 1995 CA
(2) Thundat, T; US 5719324 A 1998 CA
(3) University Of Minnesota; WO 9850773 A 1998 CA
(4) Wachter, E; US 5445008 A 1995 CA


=> d his

     (FILE 'HOME' ENTERED AT 15:05:08 ON 16 MAY 2004)

     FILE 'STNGUIDE' ENTERED AT 15:05:12 ON 16 MAY 2004

     FILE 'HOME' ENTERED AT 15:05:17 ON 16 MAY 2004

     FILE 'CA' ENTERED AT 15:05:26 ON 16 MAY 2004
L1           407 S (MICROCANTILEVER?) OR (MICRO(W)CANTILEVER?)
L2            41 S L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDI
L3             0 S L2 AND TWIST?
L4            20 S L2 AND DEFLECT?

=> b medline
COST IN U.S. DOLLARS                                SINCE FILE      TOTAL
                                                       ENTRY    SESSION
FULL ESTIMATED COST                                   119.12     119.60

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)          SINCE FILE      TOTAL
                                                       ENTRY    SESSION
CA SUBSCRIBER PRICE                                   -26.40     -26.40

FILE 'MEDLINE' ENTERED AT 15:14:08 ON 16 MAY 2004

 FILE LAST UPDATED: 15 MAY 2004 (20040515/UP).  FILE COVERS 1951 TO DATE.

 On February 29, 2004, the 2004 MeSH terms were loaded.  See HELP RLOAD
 for details. OLDMEDLINE now back to 1951.

 MEDLINE thesauri in the /CN, /CT, and /MN fields incorporate the
 MeSH 2004 vocabulary.  See http://www.nlm.nih.gov/mesh/ and
 http://www.nlm.nih.gov/pubs/techbull/nd03/nd03_mesh.html for a
 description of changes.

 This file contains CAS Registry Numbers for easy and accurate
 substance identification.

=> s l2
            48 MICROCANTILEVER?
         33494 MICRO
           750 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        123878 LIGAND?
        644622 RECEPTOR?
        574415 ANTIGEN?
        660852 ANTIBOD?
          7372 AVIDIN?
         22705 BIOTIN?
         10093 HAPTEN?
        168089 NUCLEIC
       1516856 ACID?
        167712 NUCLEIC(W)ACID?
L5          14 L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDIN?
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                OR BIOTIN? OR HAPTEN? OR NUCLEIC(W)ACID?)

=> s l2 not l5
            48 MICROCANTILEVER?
         33494 MICRO
           750 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        123878 LIGAND?
        644622 RECEPTOR?
        574415 ANTIGEN?
        660852 ANTIBOD?
          7372 AVIDIN?
         22705 BIOTIN?
         10093 HAPTEN?
        168089 NUCLEIC
       1516856 ACID?
        167712 NUCLEIC(W)ACID?
L6           0 L2 NOT L5

=> s l3
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         33494 MICRO
           750 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        123878 LIGAND?
        644622 RECEPTOR?
        574415 ANTIGEN?
        660852 ANTIBOD?
          7372 AVIDIN?
         22705 BIOTIN?
         10093 HAPTEN?
        168089 NUCLEIC
       1516856 ACID?
        167712 NUCLEIC(W)ACID?
          6087 TWIST?
L7           0 L2 AND TWIST?

=> s l4
            48 MICROCANTILEVER?
         33494 MICRO
           750 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        123878 LIGAND?
        644622 RECEPTOR?
        574415 ANTIGEN?
        660852 ANTIBOD?
          7372 AVIDIN?
         22705 BIOTIN?
         10093 HAPTEN?
        168089 NUCLEIC
       1516856 ACID?
        167712 NUCLEIC(W)ACID?
          4019 DEFLECT?
L8           5 L2 AND DEFLECT?

=> s l4 not l8
            48 MICROCANTILEVER?
         33494 MICRO
           750 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        123878 LIGAND?
        644622 RECEPTOR?
        574415 ANTIGEN?
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        660852 ANTIBOD?
          7372 AVIDIN?
         22705 BIOTIN?
         10093 HAPTEN?
        168089 NUCLEIC
       1516856 ACID?
        167712 NUCLEIC(W)ACID?
          4019 DEFLECT?
L9           0 L4 NOT L8

=> b biosis
COST IN U.S. DOLLARS                                SINCE FILE      TOTAL
                                                       ENTRY    SESSION
FULL ESTIMATED COST                                     1.14     120.74

DISCOUNT AMOUNTS (FOR QUALIFYING ACCOUNTS)          SINCE FILE      TOTAL
                                                       ENTRY    SESSION
CA SUBSCRIBER PRICE                                     0.00     -26.40

FILE 'BIOSIS' ENTERED AT 15:15:54 ON 16 MAY 2004
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FILE COVERS 1969 TO DATE.
CAS REGISTRY NUMBERS AND CHEMICAL NAMES (CNs) PRESENT
FROM JANUARY 1969 TO DATE.

RECORDS LAST ADDED: 12 May 2004 (20040512/ED)

FILE RELOADED: 19 October 2003.

=> d his

     (FILE 'HOME' ENTERED AT 15:05:08 ON 16 MAY 2004)

     FILE 'STNGUIDE' ENTERED AT 15:05:12 ON 16 MAY 2004

     FILE 'HOME' ENTERED AT 15:05:17 ON 16 MAY 2004

     FILE 'CA' ENTERED AT 15:05:26 ON 16 MAY 2004
L1           407 S (MICROCANTILEVER?) OR (MICRO(W)CANTILEVER?)
L2            41 S L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDI
L3             0 S L2 AND TWIST?
L4            20 S L2 AND DEFLECT?

     FILE 'MEDLINE' ENTERED AT 15:14:08 ON 16 MAY 2004
L5            14 S L2
L6             0 S L2 NOT L5
L7             0 S L3
L8             5 S L4
L9             0 S L4 NOT L8

     FILE 'BIOSIS' ENTERED AT 15:15:54 ON 16 MAY 2004

=> s l2
            38 MICROCANTILEVER?
         88604 MICRO
           527 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        133149 LIGAND?
        759856 RECEPTOR?
        414474 ANTIGEN?
        555389 ANTIBOD?
          7950 AVIDIN?
```

```
         25209 BIOTIN?
          8927 HAPTEN?
         48568 NUCLEIC
       1381161 ACID?
         47995 NUCLEIC(W)ACID?
L10         12 L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDIN?
               OR BIOTIN? OR HAPTEN? OR NUCLEIC(W)ACID?)

=> s l10 not l4
            38 MICROCANTILEVER?
         88604 MICRO
           527 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        133149 LIGAND?
        759856 RECEPTOR?
        414474 ANTIGEN?
        555389 ANTIBOD?
          7950 AVIDIN?
         25209 BIOTIN?
          8927 HAPTEN?
         48568 NUCLEIC
       1381161 ACID?
         47995 NUCLEIC(W)ACID?
          4203 DEFLECT?
L11          8 L10 NOT L4

=> d all 1-8

L11  ANSWER 1 OF 8  BIOSIS  COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN   2004:20552  BIOSIS
DN   PREV200400019783
TI     ***Microcantilevers***   for physical, chemical, and biological sensing.
AU   Thundat, Thomas [Reprint Author]; Majumdar, Arun
CS   Life Sciences Division, Oak Ridge National Laboratory, Mail Stop 6123, Rm.
     G148, 4500S, Oak Ridge, TN, 37831-6123, USA
     thundattg@ornl.gov; majumdar@me.berkeley.edu
SO   Barth, Friedrich G. [Editor, Reprint Author]; Humphrey, Joesph A. C.
     [Editor]; Secomb, Timothy W. [Editor]. (2003) pp. 337-355. Sensors and
     sensing in biology and engineering. print.
     Publisher: Springer-Verlag Wien KG, Sachsenplatz 4-6, A-1200, Vienna,
     Austria.
     ISBN: 3-211-83771-X (cloth).
DT   Book; (Book Chapter)
LA   English
ED   Entered STN: 24 Dec 2003
     Last Updated on STN: 24 Dec 2003
CC   General biology - Miscellaneous   00532
IT   Major Concepts
        Equipment Apparatus Devices and Instrumentation
IT   Methods & Equipment
           ***microcantilever***   sensor arrays: laboratory equipment;
         ***microcantilever***   sensors: laboratory equipment
IT   Miscellaneous Descriptors
        biological sensing; chemical sensing; differential surface stress;
        dynamic range; forces; mass additions; mechanical stress;
          ***microcantilever***   beams: bending, design, fabrication, resonance
        frequency, thermal expansion; molecular adsorption; physical sensing;
        radiation;   ***receptor***  -  ***ligand***   interactions;
        sensitivity; specificity; temperature

L11  ANSWER 2 OF 8  BIOSIS  COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN   2003:316302  BIOSIS
DN   PREV200300316302
```

TI Bioassays based on molecular nanomechanics.
AU Majumdar, Arun [Reprint Author]
CS Nanoengineering Laboratory, Department of Mechanical Engineering, University of California, Berkeley, CA, 94720, USA majumdar@me.berkeley.edu
SO Disease Markers, (2003) Vol. 18, No. 4, pp. 167-174. print. ISSN: 0278-0240 (ISSN print).
DT Article
LA English
ED Entered STN: 9 Jul 2003
Last Updated on STN: 9 Jul 2003
AB Recent experiments have shown that when specific biomolecular interactions are confined to one surface of a ***microcantilever*** beam, changes in intermolecular nanomechanical forces provide sufficient differential torque to bend the cantilever beam. This has been used to detect single base pair mismatches during DNA hybridization, as well as prostate specific ***antigen*** (PSA) at concentrations and conditions that are clinically relevant for prostate cancer diagnosis. Since cantilever motion originates from free energy change induced by specific biomolecular binding, this technique is now offering a common platform for label-free quantitative analysis of protein-protein binding, DNA hybridization DNA-protein interactions, and in general ***receptor*** - ***ligand*** interactions. Current work is focused on developing "universal microarrays" of ***microcantilever*** beams for high-throughput multiplexed bioassays.
CC Biochemistry studies - General 10060
Biochemistry studies - Nucleic acids, purines and pyrimidines 10062
Biochemistry studies - Proteins, peptides and amino acids 10064
Enzymes - General and comparative studies: coenzymes 10802
Pathology - Diagnostic 12504
Urinary system - Pathology 15506
Reproductive system - Pathology 16506
Neoplasms - Diagnostic methods 24001
Neoplasms - Pathology, clinical aspects and systemic effects 24004
Food microbiology - General and miscellaneous 39008
IT Major Concepts
Biochemistry and Molecular Biophysics; Bioprocess Engineering; Equipment Apparatus Devices and Instrumentation; Methods and Techniques
IT Diseases
prostate cancer: neoplastic disease, reproductive system disease/male, urologic disease, diagnosis
Prostatic Neoplasms (MeSH)
IT Chemicals & Biochemicals
DNA; prostate specific ***antigen*** [EC 3.4.21.77]: detection; proteins
IT Methods & Equipment
DNA hybridization: genetic techniques, laboratory techniques; bioassay: bioassay techniques, laboratory techniques; high-throughput multiplexed bioassay: bioassay techniques, laboratory techniques; label-free quantitative analysis: laboratory techniques; ***microcantilever*** beam: laboratory equipment; universal microarray: laboratory equipment
IT Miscellaneous Descriptors
DNA-protein interactions; ***antigen*** - ***antibody*** reactions; biomolecular interactions; cantilever motion; differential torque; experimental set-up; free energy change; intermolecular nanomechanical forces; molecular nanomechanics; protein-protein binding; ***receptor*** - ***ligand*** interactions; single base pair mismatches

L11 ANSWER 3 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2002:235349 BIOSIS
DN PREV200200235349
TI Characterisation of an ***antibody*** coated ***microcantilever***

as a potential immuno-based biosensor.

AU Grogan, C. [Reprint author]; Raiteri, R.; O'Connor, G. M.; Glynn, T. J.; Cunningham, V.; Kane, M.; Charlton, M.; Leech, D.
CS Department of Physics, National University of Ireland, Galway, Ireland catherinegrogan@eircom.net

SO Biosensors and Bioelectronics, (March, 2002) Vol. 17, No. 3, pp. 201-207. print.
CODEN: BBIOE4. ISSN: 0956-5663.
DT Article
LA English
ED Entered STN: 10 Apr 2002
Last Updated on STN: 10 Apr 2002

AB In this study, we investigated the activity, stability, lifetime and re-usability of monoclonal ***antibodies*** to myoglobin covalently immobilised onto microfabricated cantilever surfaces. These sensing surfaces are of interest to us in the development of novel cantilever-based immunosensors. For such sensors the ***antibody*** layer represents the sensing element while the ***microcantilever*** acts as a mechanical transducer. A procedure for producing re-usable biological coatings has been tested with different independent techniques. An Enzyme Linked Immunosorbent Assay (ELISA) was used to determine the presence of an active ***antibody*** coating, and to monitor the lifetime and stability of the immobilised ***antibody*** . Through this analysis, the activity of the immobilised ***antibody*** layer was found to be more stable with the introduction of sucrose, as a stabilising agent. Sucrose was applied to the immobilised ***antibody*** layer after each regeneration step. The immobilised ***antibody*** was found to have a stable active lifetime for up to 7 weeks. Fluorescence microscopy was used to give information on the distribution of the coating on the gold and silicon nitride sides of the cantilever. Atomic Force Microscopy was used to determine the presence of the biological coating on the cantilever and to obtain information on the surface morphology of the biological element of the sensor. The combined results provide valuable information on the development of an optimised sensing element and demonstrate a set of methods to use for future sensor-to-sensor characterisation. Preliminary experimental results showing the ***antibody*** activity against myoglobin, detected with a ***microcantilever*** based sensor prototype confirmed the motivations and potentialities of the proposed immunosensing technique.

CC Biochemistry studies - General 10060
Biochemistry studies - Proteins, peptides and amino acids 10064
Biochemistry studies - Porphyrins and bile pigments 10065
Immunology - General and methods 34502
IT Major Concepts
Biochemistry and Molecular Biophysics; Immune System (Chemical Coordination and Homeostasis); Methods and Techniques
IT Chemicals & Biochemicals
antibodies : applications, immobilized for uses; myoglobin; proteins
IT Methods & Equipment
Axiovert 25 inverted fluorescence microscope: Carl Zeiss, laboratory equipment, uses; ELISA: analytical method, labeling; ***antibody*** -coated ***microcantilevers*** : analytical method, applications, blotting/hybridization/molecular probe techniques, characterization, equipment, fabrication, uses; biosensors: analytical method, applications, blotting/hybridization/molecular probe techniques, equipment, fabrication, uses; immuno-based biosensors: analytical method, applications, blotting/hybridization/molecular probe techniques, equipment, fabrication, potential, uses
IT Miscellaneous Descriptors
bioelectronics; biotechnology
ORGN Classifier
Animalia 33000

Super Taxa
Animalia
Organism Name
animal
Taxa Notes
Animals

L11 ANSWER 4 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2002:130444 BIOSIS
DN PREV200200130444
TI Bioassay of prostate-specific ***antigen*** (PSA) using ***microcantilevers*** .
AU Wu, Guanghua; Datar, Ram H.; Hansen, Karolyn M.; Thundat, Thomas; Cote, Richard J.; Majumdar, Arun [Reprint author]
CS Department of Mechanical Engineering, University of California, Berkeley, CA, 94720, USA
majumdar@me.berkeley.edu
SO Nature Biotechnology, (September, 2001) Vol. 19, No. 9, pp. 856-860. print.
ISSN: 1087-0156.
DT Article
LA English
ED Entered STN: 6 Feb 2002
Last Updated on STN: 26 Feb 2002
AB Diagnosis and monitoring of complex diseases such as cancer require quantitative detection of multiple proteins. Recent work has shown that when specific biomolecular binding occurs on one surface of a ***microcantilever*** beam, intermolecular nanomechanics bend the cantilever, which can be optically detected. Although this label-free technique readily lends itself to formation of ***microcantilever*** arrays, what has remained unclear is the technologically critical issue of whether it is sufficiently specific and sensitive to detect disease-related proteins at clinically relevant conditions and concentrations. As an example, we report here that ***microcantilevers*** of different geometries have been used to detect two forms of prostate-specific ***antigen*** (PSA) over a wide range of concentrations from 0.2 ng/ml to 60 mug/ml in a background of human serum albumin (HSA) and human plasminogen (HP) at 1 mg/ml, making this a clinically relevant diagnostic technique for prostate cancer. Because cantilever motion originates from the free-energy change induced by specific biomolecular binding, this technique may offer a common platform for high-throughput label-free analysis of protein-protein binding, DNA hybridization, and DNA-protein interactions, as well as drug discovery.
CC Biochemistry studies - General 10060
Biochemistry studies - Proteins, peptides and amino acids 10064
Urinary system - Pathology 15506
Reproductive system - Pathology 16506
Neoplasms - Pathology, clinical aspects and systemic effects 24004
Immunology - General and methods 34502
IT Major Concepts
Biochemistry and Molecular Biophysics; Methods and Techniques; Tumor Biology
IT Diseases
prostate cancer: neoplastic disease, reproductive system disease/male, urologic disease
Prostatic Neoplasms (MeSH)
IT Chemicals & Biochemicals
human plasminogen [HP]: quantitative analysis; human serum albumin [HSA]: quantitative analysis; polyclonal anti-prostate-specific ***antigen*** ***antibody*** : ***antibody*** ;
prostate-specific ***antigen*** [PSA]: quantitative analysis
IT Methods & Equipment
bioassay: Bioassays/Physiological Analysis, bioassay method;

microcantilever : laboratory equipment
ORGN Classifier
Hominidae 86215
Super Taxa
Primates; Mammalia; Vertebrata; Chordata; Animalia
Organism Name
human: male
Taxa Notes
Animals, Chordates, Humans, Mammals, Primates, Vertebrates

L11 ANSWER 5 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2001:467069 BIOSIS
DN PREV200100467069
TI ***Microcantilever*** biosensors.
AU Thundat, T. [Reprint author]
CS Life Science Division, Oak Ridge National Laboratory, Oak Ridge, TN, USA
SO Scanning, (March-April, 2001) Vol. 23, No. 2, pp. 129. print.
Meeting Info.: Proceedings of SCANNING 2001. New York, New York, USA. May 05-07, 2001.
CODEN: SCNNDF. ISSN: 0161-0457.
DT Conference; (Meeting)
Conference; Abstract; (Meeting Abstract)
LA English
ED Entered STN: 3 Oct 2001
Last Updated on STN: 23 Feb 2002
CC General biology - Symposia, transactions and proceedings 00520
Biochemistry studies - General 10060
Biochemistry studies - Nucleic acids, purines and pyrimidines 10062
Enzymes - General and comparative studies: coenzymes 10802
Immunology - General and methods 34502
Food microbiology - General and miscellaneous 39008
IT Major Concepts
Biochemistry and Molecular Biophysics; Bioprocess Engineering; Methods and Techniques
IT Chemicals & Biochemicals
DNA; ***antibody*** ; enzyme
IT Methods & Equipment
atomic force microscopy: analytical method; ***microcantilever*** biosensor: analytical method
IT Miscellaneous Descriptors
biological sensing; Meeting Abstract

L11 ANSWER 6 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2001:172352 BIOSIS
DN PREV200100172352
TI Membrane instability in late-stage erythropoiesis.
AU Waugh, Richard E. [Reprint author]; Mantalaris, Athanassios; Bauserman, Richard G.; Hwang, William C.; Wu, J. H. David
CS Department of Pharmacology and Physiology, 601 Elmwood Ave, Rochester, NY, 14642-8711, USA
waugh@seas.rochester.edu
SO Blood, (March 15, 2001) Vol. 97, No. 6, pp. 1869-1875. print.
CODEN: BLOOAW. ISSN: 0006-4971.
DT Article
LA English
ED Entered STN: 4 Apr 2001
Last Updated on STN: 18 Feb 2002
AB During maturation of the red blood cell (RBC) from the nucleated normoblast stage to the mature biconcave discocyte, both the structure and mechanical properties of the cell undergo radical changes. The development of the mechanical stability of the membrane reflects underlying changes in the organization of membrane-associated cytoskeletal proteins, and so provides an assessment of the time course of the

development of membrane structural organization. Membrane stability in maturing erythrocytes was assessed by measuring forces required to form thin, tubular, lipid strands (tethers) from the surfaces of mononuclear cells obtained from fresh human marrow samples, marrow reticulocytes, circulating reticulocytes, and mature erythrocytes. Cells were ***biotinylated*** and manipulated with a micropipette to form an adhesive contact with a glass ***microcantilever*** , which gave a measure of the tethering force. The cell was withdrawn at controlled velocity and aspiration pressure to form a tether from the cell surface. The mean force required to form tethers from marrow reticulocytes and normoblasts was 27 +- 9 pN, compared to 54 +- 14 pN for mature cells. The energy of dissociation of the bilayer from the underlying skeleton increases 4-fold between the marrow reticulocyte stage and the mature cell, demonstrating that the mechanical stability of the membrane is not completely established until the very last stages of RBC maturation.

CC Blood - Blood and lymph studies 15002
Cytology - Animal 02506
Cytology - Human 02508
Blood - Blood cell studies 15004
Immunology - General and methods 34502

IT Major Concepts
Blood and Lymphatics (Transport and Circulation)

IT Parts, Structures, & Systems of Organisms
bone marrow: blood and lymphatics, immune system; erythrocytes: blood and lymphatics, membrane instability; mononuclear cells: blood and lymphatics, immune system; reticulocytes: blood and lymphatics

IT Miscellaneous Descriptors
erythropoiesis; tether formation

ORGN Classifier
Hominidae 86215
Super Taxa
Primates; Mammalia; Vertebrata; Chordata; Animalia
Organism Name
human
Taxa Notes
Animals, Chordates, Humans, Mammals, Primates, Vertebrates

L11 ANSWER 7 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2001:115517 BIOSIS
DN PREV200100115517
TI Chemical sensors and biosensors in liquid environment based on ***microcantilevers*** with amplified quality factor.
AU Tamayo, J. [Reprint author]; Humphris, A. D. L.; Malloy, A. M.; Miles, M. J.
CS H.H. Wills Physics Laboratory, University of Bristol, Royal Fort, Tyndall Avenue, Bristol, BS8 1TL, UK
jtamayo@imm.cnm.csic.es
SO Ultramicroscopy, (January, 2001) Vol. 86, No. 1-2, pp. 167-173. print.
CODEN: ULTRD6. ISSN: 0304-3991.
DT Article
LA English
ED Entered STN: 7 Mar 2001
Last Updated on STN: 15 Feb 2002
AB A new technique is presented for bio/chemical sensors, based on ***microcantilevers*** , for detection in liquid environment. The low quality factor of the cantilever in liquid is increased up to three orders of magnitude by using Q-control. This enables AC detection that is immune to the long-term drift of the DC cantilever response in liquids, and to temperature variations. This technique has been applied for the detection of ethanol in aqueous solution by using the microbalance method, and for ***antibody*** / ***antigen*** recognition by the surface stress method. The results show the feasibility and very high sensitivity of these novel devices.

CC Biochemistry studies - General 10060
IT Major Concepts
Chemistry; Methods and Techniques
IT Chemicals & Biochemicals
ethanol
IT Methods & Equipment
biosensors: molecular method, molecular probe techniques; chemical sensors: molecular method, molecular probe techniques
IT Miscellaneous Descriptors
liquid environment
RN 64-17-5 (ethanol)

L11 ANSWER 8 OF 8 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AN 2001:104490 BIOSIS
DN PREV200100104490
TI A ***microcantilever*** device to assess the effect of force on the lifetime of selectin-carbohydrate bonds.
AU Tees, David F. J.; Waugh, Richard E.; Hammer, Daniel A. [Reprint author]
CS Department of Chemical Engineering, University of Pennsylvania, 220 S. 33rd St., 311A Towne Bldg., Philadelphia, PA, 19104, USA
hammer@seas.upenn.edu
SO Biophysical Journal, (February, 2001) Vol. 80, No. 2, pp. 668-682. print.
CODEN: BIOJAU. ISSN: 0006-3495.
DT Article
LA English
ED Entered STN: 28 Feb 2001
Last Updated on STN: 15 Feb 2002
AB A ***microcantilever*** technique was used to apply force to ***receptor*** - ***ligand*** molecules involved in leukocyte rolling on blood vessel walls. E-selectin was adsorbed onto 3-mum-diameter, 4-mm-long glass fibers, and the selectin ***ligand*** , sialyl Lewisx, was coupled to latex microspheres. After binding, the microsphere and bound fiber were retracted using a computerized loading protocol that combines hydrodynamic and Hookean forces on the fiber to produce a range of force loading rates (force/time), rf. From the distribution of forces at failure, the average force was determined and plotted as a function of ln rf. The slope and intercept of the plot yield the unstressed reverse reaction rate, kro, and a parameter that describes the force dependence of reverse reaction rates, ro. The ***ligand*** was titrated so adhesion occurred in apprx30% of tests, implying that >80% of adhesive events involve single bonds. Monte Carlo simulations show that this level of multiple bonding has little effect on parameter estimation. The estimates are ro = 0.048 and 0.016 nm and kro = 0.72 and 2.2 s-1 for loading rates in the ranges 200-1000 and 1000-5000 pN s-1, respectively. Levenberg-Marquardt fitting across all values of rf gives ro = 0.034 nm and kro = 0.82 s-1. The values of these parameters are in the range required for rolling, as suggested by adhesive dynamics simulations.
CC Immunology - General and methods 34502
Cytology - Animal 02506
Mathematical biology and statistical methods 04500
Biochemistry studies - General 10060
Biophysics - Biocybernetics 10515
Cardiovascular system - Physiology and biochemistry 14504
Blood - Blood and lymph studies 15002
Blood - Blood cell studies 15004
IT Major Concepts
Biochemistry and Molecular Biophysics; Models and Simulations (Computational Biology); Equipment, Apparatus, Devices and Instrumentation
IT Parts, Structures, & Systems of Organisms
blood vessel walls: circulatory system; leukocyte: blood and lymphatics, immune system, rolling
IT Chemicals & Biochemicals

```
          ***receptor***  -  ***ligand***   molecules
IT   Methods & Equipment
       Monte Carlo simulations: simulation method;   ***microcantilever***
       device: equipment
IT   Miscellaneous Descriptors
       adhesive dynamics; force; selectin-carbohydrate bonds


=> s l3
            38 MICROCANTILEVER?
         88604 MICRO
           527 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        133149 LIGAND?
        759856 RECEPTOR?
        414474 ANTIGEN?
        555389 ANTIBOD?
          7950 AVIDIN?
         25209 BIOTIN?
          8927 HAPTEN?
         48568 NUCLEIC
       1381161 ACID?
         47995 NUCLEIC(W)ACID?
          6336 TWIST?
L12         0 L2 AND TWIST?

=> s l4
            38 MICROCANTILEVER?
         88604 MICRO
           527 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        133149 LIGAND?
        759856 RECEPTOR?
        414474 ANTIGEN?
        555389 ANTIBOD?
          7950 AVIDIN?
         25209 BIOTIN?
          8927 HAPTEN?
         48568 NUCLEIC
       1381161 ACID?
         47995 NUCLEIC(W)ACID?
          4203 DEFLECT?
L13         4 L2 AND DEFLECT?

=> s l13 not l4
            38 MICROCANTILEVER?
         88604 MICRO
           527 CANTILEVER?
             3 MICRO(W)CANTILEVER?
        133149 LIGAND?
        759856 RECEPTOR?
        414474 ANTIGEN?
        555389 ANTIBOD?
          7950 AVIDIN?
         25209 BIOTIN?
          8927 HAPTEN?
         48568 NUCLEIC
       1381161 ACID?
         47995 NUCLEIC(W)ACID?
          4203 DEFLECT?
L14         0 L13 NOT L4

=> d l13 1-4 ti
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L13 ANSWER 1 OF 4 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Investigation of the ***antigen*** ***antibody*** reaction between anti-bovine serum albumin (a-BSA) and bovine serum albumin (BSA) using piezoresistive ***microcantilever*** based sensors.

L13 ANSWER 2 OF 4 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Towards biosensing with terahertz spectroscopy: ***Ligand*** binding effects.

L13 ANSWER 3 OF 4 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Development of nanomechanical biosensors for detection of the pesticide DDT.

L13 ANSWER 4 OF 4 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
TI Micromechanical ***antibody*** sensor.

=> d l13 4 ab

L13 ANSWER 4 OF 4 BIOSIS COPYRIGHT 2004 BIOLOGICAL ABSTRACTS INC. on STN
AB A sensor apparatus is provided using a ***microcantilevered*** spring element having a coating of a detector molecule such as an ***antibody*** or ***antigen*** . A sample containing a target molecule or substrate is provided to the coating. The spring element bends in response to the stress induced by the binding which occurs between the detector and target molecules. ***Deflections*** of the cantilever are detected by a variety of detection techniques. The ***microcantilever*** may be approximately 1 to 200 mum long, approximately 1 to 50 mum wide, and approximately 0.3 to 3.0 mum thick. A sensitivity for detection of ***deflections*** is in the range of 0.01 nanometers.

=> d his

(FILE 'HOME' ENTERED AT 15:05:08 ON 16 MAY 2004)

FILE 'STNGUIDE' ENTERED AT 15:05:12 ON 16 MAY 2004

FILE 'HOME' ENTERED AT 15:05:17 ON 16 MAY 2004

FILE 'CA' ENTERED AT 15:05:26 ON 16 MAY 2004
L1 407 S (MICROCANTILEVER?) OR (MICRO(W)CANTILEVER?)
L2 41 S L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDI
L3 0 S L2 AND TWIST?
L4 20 S L2 AND DEFLECT?

FILE 'MEDLINE' ENTERED AT 15:14:08 ON 16 MAY 2004
L5 14 S L2
L6 0 S L2 NOT L5
L7 0 S L3
L8 5 S L4
L9 0 S L4 NOT L8

FILE 'BIOSIS' ENTERED AT 15:15:54 ON 16 MAY 2004
L10 12 S L2
L11 8 S L10 NOT L4
L12 0 S L3
L13 4 S L4
L14 0 S L13 NOT L4

=> b ca

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FILE COVERS 1907 - 13 May 2004 VOL 140 ISS 21
FILE LAST UPDATED: 13 May 2004  (20040513/ED)

  This file contains CAS Registry Numbers for easy and accurate
  substance identification.


=> s l4 and torsion(w)bar?
         19247 TORSION
        717878 BAR?
           176 TORSION(W)BAR?
L15          0 L4 AND TORSION(W)BAR?

=> s l1 and (torsion(w)bar?)
         19247 TORSION
        717878 BAR?
           176 TORSION(W)BAR?
L16          0 L1 AND (TORSION(W)BAR?)

=> d his

     (FILE 'HOME' ENTERED AT 15:05:08 ON 16 MAY 2004)

     FILE 'STNGUIDE' ENTERED AT 15:05:12 ON 16 MAY 2004

     FILE 'HOME' ENTERED AT 15:05:17 ON 16 MAY 2004

     FILE 'CA' ENTERED AT 15:05:26 ON 16 MAY 2004
L1           407 S (MICROCANTILEVER?) OR (MICRO(W)CANTILEVER?)
L2            41 S L1 AND (LIGAND? OR RECEPTOR? OR ANTIGEN? OR ANTIBOD? OR AVIDI
L3             0 S L2 AND TWIST?
L4            20 S L2 AND DEFLECT?

     FILE 'MEDLINE' ENTERED AT 15:14:08 ON 16 MAY 2004
L5            14 S L2
L6             0 S L2 NOT L5
L7             0 S L3
L8             5 S L4
L9             0 S L4 NOT L8
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     FILE 'BIOSIS' ENTERED AT 15:15:54 ON 16 MAY 2004
L10            12 S L2
L11             8 S L10 NOT L4
L12             0 S L3
L13             4 S L4
L14             0 S L13 NOT L4

     FILE 'CA' ENTERED AT 15:18:18 ON 16 MAY 2004
L15             0 S L4 AND TORSION(W)BAR?
L16             0 S L1 AND (TORSION(W)BAR?)

=> logoff y
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